

On the identity of *Psodos perlinii* Turati, 1914 (Geometridae: Ennominae)

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Abstract. One of the type specimens of *Psodos perlinii* Turati, 1914, which was believed destroyed was surprisingly found in the Wehrli collection at the Museum Alexander Koenig in Bonn. This specimen is here designated as a lectotype and is figured for the first time. A study of Turati's original description as well as an examination of the genitalia of the specimens collected in the Adamello region showed that "*Psodos perlinii*" is conspecific with the species *Psodos bentelii* Rätzer, 1890. Because of the geographical isolation of the Adamello population and its phenotypic characteristics, we propose giving *P. perlinii* the status of a subspecies of *P. bentelii*: *Psodos bentelii perlinii* Turati, 1914 stat. n.

Zusammenfassung. Eines der zerstört geglaubten Typus-Exemplare von *Psodos perlinii* Turati, 1914 wurde überraschend in der Kollektion Wehrli am Museum Alexander Koenig Bonn gefunden. Das Exemplar wird hier als Lectotypus designiert und erstmals abgebildet. Das Studium der Urbeschreibung Turatis sowie genitalmorphologische Untersuchungen der am Adamello gesammelten Tiere ergaben, dass das Taxon „*P. perlinii*“ mit *Psodos bentelii* Rätzer, 1890 konspezifisch ist. Aufgrund der geografischen Isolation und phänotypischer Charakteristika wird für *P. perlinii* ein Unterartstatus zu *P. bentelii* vorgeschlagen: *Psodos bentelii perlinii* Turati, 1914 stat. n.

Introduction

During our work on the taxonomy and distribution of the high mountain Geometrid moths genus *Psodos* Treitschke, 1825 we came across the often mentioned and mysterious taxon '*Psodos perlinii* Turati, 1914', whose identity has remained dubious despite various attempts of clarification (Wehrli 1919, 1921; Forster & Wohlfahrt 1980; Burmann & Tarmann 1983).

At the beginning of the last century, Conte Emilio Turati described a new Geometrid moth species based on two males collected by C. Krüger in the higher region of the Adamello in Northern Italy, which he named *Psodos perlinii* (Turati 1914). After that, E. Wehrli acquired a third specimen from the type locality, also collected by C. Krüger, which he figured in his first work on the genus *Psodos* "with doubts" as *P. perlinii* (Wehrli 1919). After examination of the genitalia, Wehrli (1921) held that illustrated specimen to be a taxon "close to" *Psodos canaliculata* (Hochenwarth, 1785) (Wehrli 1921). Consequently, Schwingenschuss (1923) listed *P. perlinii* as a separate species within the *P. canaliculata* group. Finally, however, Wehrli stated that the third specimen in question had "turned out a true *trepidaria*", i. e. *P. canaliculata* (Wehrli 1954).

Eventually Wehrli received from Turati one of the two type specimens ("Kotype") for his comprehensive work on the palaearctic Geometridae. However, he was only permitted to examine the specimen without dissection (Wehrli 1954). On the bases of an external examination of the male genitalia of that type specimen, Wehrli found a close relation of *P. perlinii* to *Psodos spitzi* Rebel, 1905 ("soweit dies durch die Trockenuntersuchung festgestellt werden konnte" [as far as this was possible to determine through a dry

examination], Wehrli 1954: 631) and gave a comparison of both species. Accordingly, Wolfsberger (1966) treated *P. perlinii* as a separate species within the subgenus *Triglavia* Povolny & Moucha, 1955, to which *P. spitzii* belongs. However, this was not yet the end of the confusion on *P. perlinii*.

Forster & Wohlfahrt (1981) contended in their well-known standard work on Central European Geometridae that *P. perlinii* is possibly a subspecies of *Psodos coracina* (Esper, 1805). Burmann & Tarmann (1983) came to the same conclusion after evaluation of material collected (by K. Burmann & J. Wolfsberger) in the Adamello Mountains and after comparison with the original description by Turati and with the results of comprehensive examinations of the genitalia of other species. Nevertheless, the authors did not avoid drawing attention to the problems which occurred with regard to the destruction of Turati's types in the collection of F. Hartig (Museo Regionale di Scienze Naturali di Torino). Thus, the attempts by Burmann & Tarmann (1983) to clarify the identity of *P. perlinii* remained unsatisfactory. Whereas Müller (1996), following Raineri & Zangheri (1995), still treated *P. perlinii* in his check-list of the Geometrid moths of Europe as a separate species, *P. perlinii* is listed in Scoble (1999), in agreement with Burmann & Tarmann (1983), as a subspecies of *P. coracina*.

Since 1954, the comprehensive Wehrli collection of *Psodos* has been deposited in the Museum Alexander Koenig in Bonn. At the beginning of the 1980s, this *Psodos* material was loaned to the Tiroler Landesmuseum Ferdinandeum in Innsbruck, where it was then considerably damaged by floods in 1985. Fortunately, most of the labels remained legible and most of the abdomens were still preserved. In this situation, the colleagues at the Innsbruck museum made the farsighted decision to make about 1,600 genitalia slides of the partially damaged moths during the following years, which we were able to work on. Among this material, we found a specimen that Wehrli had received from Turati (see Wehrli 1954) and that he obviously did not return. Its labels, above all the almost square, bright red label with a thin black edge surprisingly enough reveal that this must be the one of the two male type specimens of *Psodos perlinii* mentioned by Wehrli (1954) (Figs 1–3). The extraordinary find, finally, allows unveiling the mystery around *P. perlinii*, almost a century after its description.

Abbreviations

MNC	Museum für Naturkunde Chemnitz (Coll. S. Erlacher), Germany
TLMF	Tiroler Landesmuseum Ferdinandeum, Innsbruck, Austria
ZFMK	Zoologisches Forschungsmuseum Alexander Koenig, Bonn, Germany
ZSM	Zoologische Staatssammlung, Munich, Germany

Material and Methods

Photographs were taken with a Nikon D200 camera attached to a Nikon stereo microscope SMZ1000 for the genitalia and a Nikon Coolpix 4500 camera for the specimens.

Material. *Psodos perlinii* Turati, 1914: Lectotype ♂ (hereby designated in order to stabilize nomenclature according to article 74 ICZN), 'Italia sept. | Valcamonica | [L.] Salar[no] | Geo. C. Krüger',

'*perlinii* Trti', <red label:> 'unreadable', 'PRÄP. NR. 1447 | M. Hreblay präp.', <red label:> 'LECTOTYPUS | *Psodos perlinii* Turati, 1914 | designated by | Erlacher & Junghans (2009)', ZFMK. – **Italy:** 1♂; Trentino, Adamello, Refugio Madrone, 2500 m, 01.vii.1964, leg. J. Wolfsberger; ZSM. 1♂; ibd.; genitalia slide no. GU:27/1999, ZSM. 1♂; ibd., 07.–10.viii.1964, leg. K. Burmann; TLMF. 1♂; ibd. 1♀; ibd.; CJ-64, TLFM. 1♀; ibd., 01.viii.1964, leg. J. Wolfsberger; GU:28/1999, ZSM. 1♂; ibd., 2500–2800 m, 01.viii.1965, leg. J. Wolfsberger; CJ-72, ZSM. 1♂; ibd., 01.viii.1967, leg. J. Wolfsberger; ZSM. 1♂; ibd.; CJ-71, ZSM. 1♂; ibd., 2900 m, mid–viii.1958, leg. K. Burmann; G0054, TLMF. 1♀; ibd., 31.vii.1964, leg. K. Burmann; G0055, TLMF. 1♂; ibd., 2500 m, 9.vii.1994, leg. S. Erlacher; SE-356, MNC. 1♂; ibd.; MNC. – *Psodos bentelii* Rätzer, 1890: **Italy:** 1♀; Dolomiti, 28.vii.1907, leg. A. Petry; G1264, ZFMK. 1♂; ibd., Passo di Valparolo, 13.vii.1994, leg. S. Erlacher, CJ-38, MNC. 1♂; ibd., 2200 m, 13.vii.1994, leg. S. Erlacher; GU:15/1999, MNC. Trentino-Alto Adige, Bolzano, Lago di Antermoja, 15.vii.1924, leg. Dannehl, ZSM. 1♀; Südtirol, Seiser Alm, 10.vii.1921, unknown collector; G0242, ZFMK. 1♂; ibd.; G0243, ZFMK. **Switzerland:** 1 sp.; Graubünden, Engadin, Alp Grüm, 05.viii.1926, leg. C. Hörhammer, ZSM. 1♂; ibd., Diavolezza, 3000 m, 31.vii.1922, leg. E. Wehrli; G0319, ZFMK. 1♂; ibd., Piz Campascio, 01.viii.1922, leg. E. Wehrli; G0298, ZFMK. 1♂; ibd.; G0314, ZFMK. 1♂; ibd.; G0315, ZFMK. 1♂; ibd.; G1827, ZFMK. 1♂; ibd., Piz Lagalp, 29.vii.1922, unknown collector; G0317, ZFMK. 1♂; Uri, Furka, 14.vii.1912, unknown collector; G0305, ZFMK. 1♂; Wallis, Eggerhorn, 24.vii.1912, unknown collector; G0856, ZFMK. 1♂; ibd., Gornergrat, 11.viii.1898, unknown collector; G0303, ZFMK. 1♂; ibd., 02.viii.1899, unknown collector; G0724, ZFMK. 1♀; ibd., 08.viii.1917, leg. E. Wehrli; G0287, ZFMK. 1♂; ibd., 16.vii.1919, leg. E. Wehrli; G0262, ZFMK. 1♀; ibd.; G0263, ZFMK. 1♂; ibd.; G0264, ZFMK. 1♂; ibd.; G0265, ZFMK. 1♂; ibd.; G0266, ZFMK. 1♂; ibd.; G0267, ZFMK. 1♂; ibd.; G0268, ZFMK. 1♂; ibd.; G0269, ZFMK. 1♂; ibd.; G1683, ZFMK. 1♂; ibd., 28.vii.1919, leg. E. Wehrli; G1421, ZFMK. 1♂; ibd.; G1433, ZFMK. 1♂; ibd.; G0272, ZFMK. 1♂; ibd.; G0273, ZFMK. 1♂; ibd.; G0274, ZFMK. 1♂; ibd.; G0275, ZFMK. 1♂; ibd.; G0276, ZFMK. 1♀; ibd.; G0277, ZFMK. 1♂; ibd., 03.viii.1919, leg. E. Wehrli; G0271, ZFMK. 1♂; ibd., 28.viii.1919, leg. E. Wehrli; G1659, ZFMK. 1♂; ibd., 25.vii.1920, leg. E. Wehrli, ZFMK. 1 v; ibd.; G0282, ZFMK. 1♂; ibd.; G0283, ZFMK. 1♂; ibd.; G0285, ZFMK. 1♂; ibd.; G1669, ZFMK. 1♂; ibd.; G1705, ZFMK. 1♂; ibd.; G1721, ZFMK. 1♂; ibd.; G1722, ZFMK. 1♂; ibd.; G1737, ZFMK. 1♂; ibd.; G1738, ZFMK. 1♂; ibd.; G1753, ZFMK. 1♂; ibd., 28.vii.1920, leg. E. Wehrli; G0278, ZFMK. 1♂; ibd.; G0279, ZFMK. 1♂; ibd.; G0280, ZFMK. 1♂; ibd.; G0281, ZFMK. 1♂; ibd.; G1671, ZFMK. 1♂; ibd.; G1682, ZFMK. 1♀; ibd.; G1698, ZFMK. 1♂; ibd.; G1729, ZFMK. 1♂; ibd.; G1730, ZFMK. 1♂; ibd.; G1746, ZFMK. 1♂; ibd.; G1837, ZFMK. 1♂; ibd., 08.viii.1920, leg. E. Wehrli; G1679, ZFMK. 1♂; ibd.; G1833, ZFMK. 1♂; ibd.; G1836, ZFMK. 1♂; ibd., 25.viii.1920, leg. E. Wehrli; G1660, ZFMK. 1♂; ibd., 28.viii.1920, leg. E. Wehrli; G1661, ZFMK. 1♂; ibd., 20.x.1920, leg. Bäle; G0270, ZFMK. 1♀; ibd.; G0288, ZFMK. 1♂; ibd., 12.vii.1921, leg. E. Wehrli; G0307, ZFMK. 1♀; ibd.; G0308, ZFMK. 1♂; ibd.; G0309, ZFMK. 1♂; ibd.; G0310, ZFMK. 1♂; ibd.; G0311, ZFMK. 1♂; ibd.; G0312, ZFMK. 1♂; ibd.; G1386, ZFMK. 1♂; ibd.; G1396, ZFMK. 1♂; ibd.; G1830, ZFMK. 1♂; ibd.; G1838, ZFMK. 1♂; ibd., 17.vii.1921, leg. E. Wehrli; G1436, ZFMK. 1♂; ibd., 27.vii.1931, leg. Wehrli; G1503, ZFMK. 1 sp.; ibd., 16.vii.1935, leg. Eisenberger, ZSM. 1♂; ibd., 22.vi.1937, leg. E. Wehrli; G1610, ZFMK. 1♂; ibd., 22.vii.1937, leg. E. Wehrli; G1594, ZFMK. 1♂; ibd.; G1612, ZFMK. 1♂; ibd.; G1630, ZFMK. 1♂; ibd.; G1631, ZFMK. 1♂; ibd.; G1632, ZFMK. 1♂; ibd.; G1633, ZFMK. 1♂; ibd.; G1634, ZFMK. 1♂; ibd., 24.vii.1937, leg. E. Wehrli; G1404, ZFMK. 1♂; ibd.; G1406, ZFMK. 1♂; ibd.; G1407, ZFMK. 1♂; ibd.; G1608, ZFMK. 1♂; ibd.; G1623, ZFMK. 1♂; ibd.; G1629, ZFMK. 1♂; ibd., 20.vii.1938, leg. E. Wehrli; G1435, ZFMK. 1♂; ibd.; G1507, ZFMK. 1♂; ibd.; G1508, ZFMK. 1♂; ibd.; G1509, ZFMK. 1♂; ibd.; G1515, ZFMK. 1♂; ibd.; G1516, ZFMK. 1♀; ibd.; G1528, ZFMK. 1♂; ibd.; G1531, ZFMK. 1♀; ibd.; G1553, ZFMK. 1♀; ibd.; G1574, ZFMK. 1♂; ibd., 27.vii.1939, leg. E. Wehrli; G1378, ZFMK. 1♂; ibd.; G1397, ZFMK. 1♂; ibd.; G1429, ZFMK. 1♂; ibd.; G1430, ZFMK. 1♂; ibd.; G1499, ZFMK. 1♂; ibd.; G1618, ZFMK. 1♂; ibd., 31.vii.1939, leg. E. Wehrli; G1394, ZFMK. 1♂; ibd.; G1395, ZFMK. 1♂; ibd., 12.viii.1942, leg. E. Wehrli; G1495, ZFMK. 1♂; ibd.; G1496, ZFMK. 1♂; ibd., 28.vii.1948, leg. E. Wehrli; G1754, ZFMK. 1♂; ibd., 01.viii.1962, leg. Sielmann; G1314, ZFMK. 1 sp.; ibd., 19.vi.1962, unknown collector, ZSM. 1♂; ibd., 3100 m, 18–24.vii.1955, leg. Groß; ZSM. 1♂; ibd., Matterhorn, 2600–2700 m, 15.vii.1997, leg. J. Gelbrecht *et al.*; GU:21/1999, coll. J. Gelbrecht, Königs Wusterhausen. 1♂; ibd., Mettelhorn, 18.vii.1919, leg. E. Wehrli; G1670, ZFMK. 1♂; ibd.; G1706, ZFMK. 1♂; ibd., 04.viii.1934, leg. E. Wehrli; G1613, ZFMK. 1♂; ibd., Riffelalp, vii/viii.1942, leg. E. Wehrli; G1494, ZFMK. 1♂; ibd., Rotenbachn, 22.vii.1937, leg. E. Wehrli; G1611, ZFMK. 1♂; ibd., 06.viii.1937, leg. E. Wehrli; G1599, ZFMK. 1♂; ibd.; G1609, ZFMK. 1♂; ibd., 20.vii.1938, leg. E. Wehrli; G1533, ZFMK. 1♂; ibd.; G1539, ZFMK. 1♂; ibd.; G1569, ZFMK. 1♂; ibd., 25.vii.1938, leg. E. Wehrli; G1586, ZFMK. 1♂; ibd., 30.vii.1938, leg. E. Wehrli; G1543, ZFMK. 1♂; ibd.; G1545, ZFMK. 1♂; ibd.; G1556, ZFMK. 1♂; ibd.; G1579, ZFMK. 1♂; ibd.; G1581, ZFMK. 1♂; ibd., Rotenboden, 23.vii.1919, leg. E. Wehrli; G0301, ZFMK. 1♂; ibd., 20.[viii].1938, leg. E. Wehrli; G1505, ZFMK. 1♂; ibd., Saas-Fee, 31.vii.1956, leg. J. Wolfsberger; ZSM. 1♀; ibd., Schwarzsee, 19.vii.1918, unknown collector; G0352, ZFMK. 1♂; ibd., Stellisee, 19.vii.1938, leg. E. Wehrli; G1385, ZFMK. 1 sp.; ibd., Stockhorngrat, 07.viii.1919, leg. E. Wehrli, ZSM. 1♂; ibd., Trifthorn, 31.vii.1920, leg. E. Wehrli; G0299, ZFMK. 1♂; ibd.; G0300, ZFMK. 1♂; ibd., 3730 m, 09.viii.1919, leg. E. Wehrli; G1681, ZFMK. 1♂; ibd., Triftjoch, 07.viii.1920, leg. E. Wehrli; G1689, ZFMK. 1♂; ibd., Weg-Britannia Hütte, 2600 m, 22.vii.1941, leg. E. Wehrli; G0803,

ZFMK. 1♂; ibd.; G0804, ZFMK. 1♂; ibd.; G0805, ZFMK. 1♂; ibd.; G0807, ZFMK. 1♂; ibd.; G0814, ZFMK. 1♂; ibd., 2700 m, 22.vii.1941, leg. E. Wehrli; G0811, ZFMK. 1♀; ibd., 2800 m, 26.vii.1941, leg. E. Wehrli; G0815, ZFMK. 1♂; ibd.; G0817, ZFMK. 1♂; ibd.; G0244, ZFMK. 1♀; ibd., Weg-Mischabel Hütte, 2300 m, 29.vii.1941, leg. E. Wehrli; G0821, ZFMK. 1 sp.; ibd., Zermatt, 07.viii.1912, unknown collector, ZSM. 1♂; ibd., 12.vii.1918, leg. E. Wehrli; G0289, ZFMK. 1♂; ibd.; G0290, ZFMK. 1♂; ibd.; G0291, ZFMK. 1♂; ibd.; G0292, ZFMK. 1♂; ibd.; G0293, ZFMK. 1♀; ibd.; G0294, ZFMK. 1♂; ibd.; G0295, ZFMK. 1♂; ibd.; G0296, ZFMK. 1♂; G0297, ZFMK. 1♂; G0326, ZFMK. 1♀; ibd.; G0332, ZFMK. 1♀; ibd.; G0339, ZFMK. 1♀; ibd.; G0433, ZFMK. 1♂; G1651, ZFMK. 1♂; G1690, ZFMK. 1♂; G1697, ZFMK. **France**: 1♂, Alpes-Maritimes, Cime di Argentera, 3350 m, 30.vii.1923, leg. E. Wehrli; G0259, ZFMK. 1♂; ibd., 31.vii.1923, leg. E. Wehrli; G0255, ZFMK. 1♀; ibd.; G0256, ZFMK. 1♀; ibd.; G0257, ZFMK. 1♂; ibd.; G0258, ZFMK. 1♂; ibd., Mont Gélais, 20.vii.1923, leg. A. Ströbl; G0260, ZFMK. 1♀; ibd., 24.vii.1923, leg. R. Kitschelt; G0860, ZFMK. 1♀; Haute-Pyrénées, Cauterets, date unknown, unknown collector; G0221, ZFMK. 1♀; ibd., Gèdre, 31.vii.1898, leg. E. Wehrli; G0225, ZFMK. 1♂; ibd., Pic du Midi, 26.vii.1901, unknown collector; G1250, ZFMK. 1♂; Haute-Savoie, Mont Blanc, 2000 m, 26.vii.1926, leg. W. Ripper; G0381, ZFMK. 2 sp.; Provence, Alpes-Maritimes, Saint-Martin, 01.vii.1913, unknown collector, ZSM. 1♂; Pyrénées-Orientales, Arele Nord du Contigou, 31.vii.–01.viii.1909, leg. E. Wehrli; G0210, ZFMK. 1♀; ibd., Cambras d'Aze, 10.vii.1929, v.d.Goltz; G0222, ZFMK. 1♂; ibd., Esquerdes de Routje, 23.vii.1909, leg. H. Powell; G0212, ZFMK. 1♂; ibd.; G0213, ZFMK. 1♂; ibd.; G0214, ZFMK. 1♂; ibd.; G0215, ZFMK. 1♂; ibd.; G0216, ZFMK. 1♂; ibd.; G0217, ZFMK. 1♀; ibd., Haute-Vallée-de-Montet, 26.vii.1909, leg. H. Powell; G0207, ZSM. 1♂; ibd.; G0208, ZSM. 1♂; ibd.; G0209, ZSM. 1♀; ibd., Mont Canigou, 24.vii.1929, unknown collector; G0219, ZFMK. 1♀; ibd.; G0220, ZFMK. 1♂; ibd., Vernet-les-Bains, date unknown, E. Wehrli; G0211, ZFMK. 1♂; ibd.; G0223, ZFMK. 1♂; Savoie, Bonneval-sur-Arc, 1400 m, 22.viii.1912, unknown collector; G1302, ZFMK. 1♂; ibd., Pralognan, 1440 m, date unknown, unknown collector; G1278, ZFMK. **Spain**: 1♂; Aragon, Ull de Ter, 23–25.vii.1909, unknown collector; G0218, ZFMK. **Romania**: 1♂; Retezat, Zenoga, 2200 m, 28.vii.1932, leg. Bartha; ZSM.

Results

The study of Turati's original description and examinations of the genitalia of specimens collected in the Adamello region compared with the type specimen of *P. perlinii* showed that the latter is identical with the species *Psodos bentelii* Rätzer, 1890. Nevertheless, the geographical isolation of the Adamello population and its phenotypic characteristics justify assigning the status of *P. perlinii* as a subspecies of *P. bentelii*:

Psodos bentelii perlinii Turati, 1914 stat. n.

(Figs 1–8)

Redescription. Male (Figs 1–2). Measurements. Body length: 9.8 mm. Wingspan (longest distance vertical to body): 21.9–24.1 mm. Length of forewing (along the costa): 12.2–13.4 mm. Width of forewing (longest distance parallel to body): 8.4–9.1 mm. Upperside of wings with slight from greenish-blue to metallic shiny scales. Ground colour of upperside of wings: unsettled soot-black with dappled light scales. Forewings with marked distal point. Hindwings with weak distal point. Antemedian line not as clearly serrated as postmedian line, rather rounded. Antemedian line not continued on hindwings. Distal line serrated, continued on hindwings, towards the edge delimited by thin light shades. Terminal fascia mostly interrupted in a wedge-shaped way. Ground colour of underside of wings: soot-black, partially with lightly shiny scales. Antemedian line absent. Postmedian line unserrated. Distal points as on upperside. Proboscis well developed. Head, thorax and abdomen, legs and antennae in the ground colour.

Male genitalia (Fig. 4). Uncus pointed, shorter than gnathos. Gnathos long, slender, pointed, almost reaching up to tip of uncus. Costal process (sclerotised proximal part of fore-edge of valve) about two thirds of fore-edge of valve and clearly separated

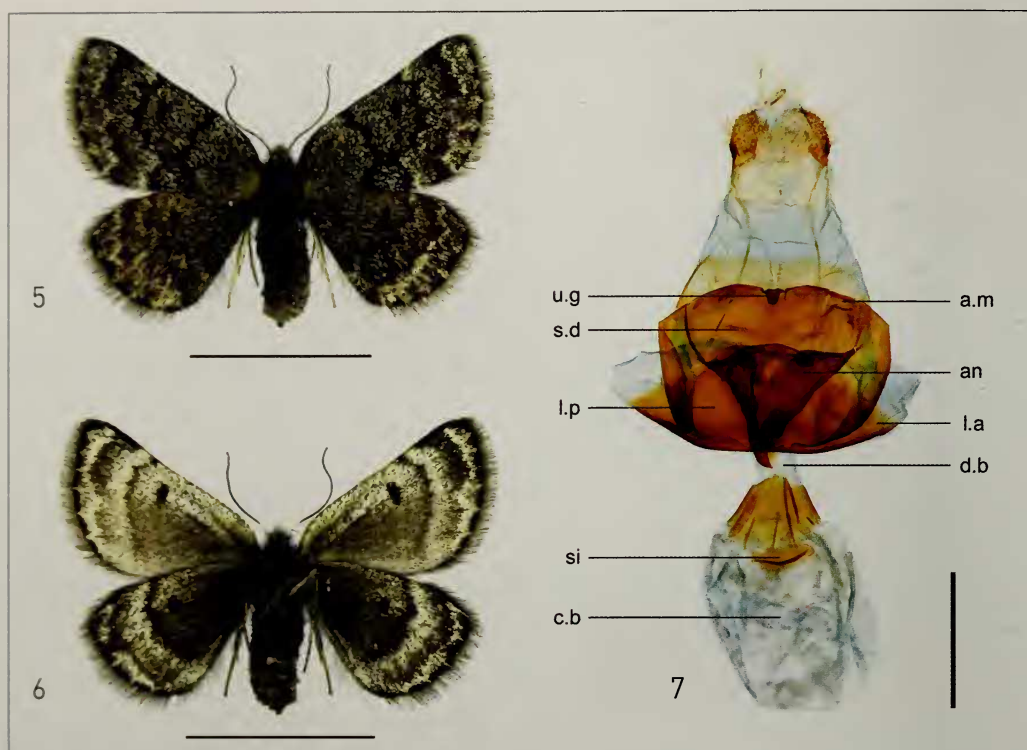


Figs 1–4. Lectotype of “*Psodos perlinii* Turati, 1914” deposited at the ZFMK. **1.** Upperside, **2.** Underside (scale bars: 10 mm). **3.** Labels. **4.** Male genitalia; genitalia slide 1447 (prep. M. Hreblay); ae – aedeagus, c.p – costal process, gn – gnathos, ju – juxta, j.a – juxta arm, sc – sacculus, sp – spines, un – uncus, va – valve (scale bar: 1.0 mm).

from that; distal with numerous strongly sclerotised spines which can form two to three rows. Proportion length of valve to juxta arm length (without sacculus) 1.78. Juxta arms slender, distally broadened, slightly arched on the inside, terminal with a group of strongly sclerotised and medially directed spines; underneath a larger canine tooth and a further dorsally-directed spine on the inner side of the juxta. Aedeagus S-shaped, first arch roughly in the centre, second arch roughly in last sixth of length, with numerous small spines at the tip. Proportion juxta arm length (without sacculus) to length of aedeagus (from bases to tip) 0.6.

Female (Figs 5–6). Measurements. Body length: 8.9 mm. Wingspan (longest distance vertical to body): 20.7–21.8 mm. Length of forewing (along of costa): 10.4–12.2 mm. Width of forewing (longest distance parallel to body): 6.6–7.6 mm. Ground colour and habitus same as in male.

Female genitalia (Fig. 7). Corpus bursae pear-shaped, membranous, anally a fourth up to a third sclerotised, in sclerotised part shaping folds. Signum with strongly sclerotised, inverted, mouth-shaped strip in anal half of corpus bursae, vertical along the longitudinal body line. Ductus bursae membranous, short, not clearly standing out against corpus bursae. Antrum funnel-shaped, orally becoming narrower only after half of antrum length; proportion length of corpus bursae (from apex to anal end of



Figs 5–7. Female of *Psodos bentelii perlinii*; data: Italy, Adamello, Rif. Mandrone, 2,500 m, 7.–10. vii.1964, leg. K. Burmann; genitalia slide CJ-64 (prep. C. Junghans); in coll. TLMF. **5.** Upperside, **6.** Underside (scale bars: 10 mm). **7.** Female genitalia of the same specimen; a.m – anal margin, an – antrum, c.b – corpus bursae, d.b – ductus bursae, l.a – lamella antevaginalis, l.p – lamella postvaginalis, s.d. – sclerotised disc, si – signum, u.g – uncus gap (scale bar: 1.0 mm).

sclerotisation) to length of antrum 0.46 mm. Lamella postvaginalis: lateroventral part (“Mittlerer Haftwulst” *sensu* Wehrli 1921) widely U-shaped, orally shaping a straight line; mediodorsal part shaping a sclerotised disc, widely heart-shaped; anal margin of sclerotised disc (“Freie Analwülste” *sensu* Wehrli 1921) not clearly arched, almost shaping a straight line; inverted anal part of sclerotised disc (“Uncuslücke” *sensu* Wehrli 1921) as little pit without orally continuing fissure. Lamella antevaginalis as narrow, grooved band, clasping Lamella postvaginalis orally and ventrally.

Diagnosis. *P. bentelii perlinii* can clearly be distinguished from the other subspecies of *P. bentelii* (ssp. *bentelii* Rätzer, 1890, ssp. *alparitima* Wehrli, 1924, ssp. *panticosea* Wehrli, 1919, ssp. *retyezatensis* Bartha, 1933, ssp. *zermattensis* Wehrli, 1919) by its dark soot-black ground colour. Phenotypically the most similar subspecies *P. bentelii zermattensis* (from region of Zermatt) is, however, on average smaller and has a yellowish scaling in its ground colour above all in the terminal area of the upperside of wings which cannot be found on *P. bentelii perlinii*. The female genitalia of *P. bentelii perlinii* slightly differ from those of the nominate subspecies. In contrast to *P. bentelii perlinii*, the oral part of antrum of *P. bentelii bentelii* becomes narrower only at its end whereas *P. bentelii perlinii* starts becoming narrower between the middle and the oral



Fig. 8. Habitat of *Psodos bentelii perlinii* near Refugio Mandrone, Northern Italy, 9.vii.1994.

end of the antrum. Furthermore, the lateroventral part of lamella postvaginalis is more rounded in *P. bentelii bentelii* than in *P. bentelii perlinii*.

Distribution. In the region of Adamello in Northern Italy *Psodos bentelii perlinii* is so far only known from the locus typicus “above the Lago Salarno” (3,000 m) and the Refugio Mandrone (2,500–2,900 m).

Life history. Host-plant(s) and early stages are unknown. Flight period: early July to mid–August. Preferred habitats are rocky areas with grassy tussocks and lichens (Fig. 8).

Discussion

It is worth mentioning that Wehrli already interpreted Turati’s original description at an early stage in a way that indicated that *P. perlinii* might be *Psodos bentelii* Rätzer, 1890 (Wehrli 1921: 167). Today, this interpretation can clearly be confirmed after examination of the type specimen. Indeed, when looked at unambiguously, there is hardly a point in Turati’s ambiguous original description that seriously contradicts this fact.

There is general agreement on what *P. bentelii* is. Good illustrations can be found in Burmann & Tarmann (1983). As well as *P. coracina*, *P. bentelii* has a strong tendency towards the formation of subspecies. Based on the geographical isolation of the

Adamello population and its phenotypic adaptation to the parent granite stone, we argue that it is justifiable to assign *P. perlinii* as a subspecies of *P. bentelii*.

Psodos bentelii perlinii was discovered in a glacier moraine above the Lago Salarno at 3,000 m in the Val di Savio, a side valley of Val Camonica, about 9 km southwest of the Refugio Mandrone. According to present knowledge three species of *Psodos*, *P. bentelii perlinii*, *P. canaliculata* and *P. coracina*, occur sympatrically close to the Refugio Mandrone, the well-known collection area of K. Burmann and J. Wolfsberger. Due to the distinct phenotypic similarity of the species observed in this region, often an examination of genitalia is required to confirm the species identification. Only in higher regions from about 3,000 m, for instance at Passo del Maroccaro above the Refugio Mandrone, there is a further species of *Psodos*, i. e. *Psodos alticolaria chalybaeus* Zerny, 1916 (examined from specimens collected by Kaesweber in 1986) which is characterised by an unusual dark black ground colour with strikingly contrasted underside of the wings. Presumably, it is here where *P. alticolaria chalybaeus* shares its habitat with *P. bentelii perlinii*.

Acknowledgements

We are grateful to Prof. Dr. Gerhard Tarmann and Dr. Peter Huemer, Tiroler Landesmuseum Ferdinandeum, Innsbruck, Dr. Dieter Stüning, Museum Alexander Koenig, Bonn, Dr. Axel Hausmann, Zoologische Staatssammlung, Munich, and Manfred Sommerer, Munich, for the loan of material and generous support. Thanks to two anonymous reviewers for their useful comments and to John Green, London, for assistance in checking the English.

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